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Is Export Diversification the Best Way to Achieve Export Growth and Stability?

A Look at Three African Countries

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Policymakers — concerned with the instability and downward trend in export earnings for Malawi, Tanzania, and Zimbabwe between 1961 and 1987 — tend to propose the remedy of export diversification. But horizontal diversification would have produced lower export earnings and more instability.

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Malawi, Tanzania, and Zimbabwe depend heavily on export earnings from a narrow base of agricultural commodities. This dependence increased between 1961-73 and 1974-87, when international prices for those commodities were declining and unstable.

Policymakers — concerned with the instability and downward trend in export earnings for the three countries — tend to equate these trends with the countries' narrow export commodity base. They often propose export diversification as an expedient remedy.

But Ali, Alwang, and Siegel found that horizontal diversification would have produced lower export earnings and more instability. Policymakers introducing horizontal diversification must first consider price forecasts, comparative advantage, the economy's changing structure, and the costs of adjustment. Reactions to historical price movements can produce unexpected, undesirable results.

A shift during this period from favorable to unfavorable price trends, and shifts in the covariances of deviations from price trends, complicate the design of export diversification policies — especially policies aimed at stabilizing export earnings. Generally, although international commodity prices have fallen and instability has increased, the most effective way to achieve growth and stability in export earnings is to increase and stabilize agricultural production and the volume of exports.

Using several measures for horizontal export diversification of commodities in the existing export mix, Ali, Alwang, and Siegel found no clear relationship between the degree of export diversification and export performance in Malawi, Tanzania, and Zimbabwe. Their analysis shows that different export diversification policies can help fulfill different policy goals.

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Table of Contents

1.	Introduction	1
2.	Export Diversification — An Overview	6
3.	Measures of Export Performance and Diversification	8
	3.1 Export Concentration	10
	3.2 Portfolio Variance	11
	3.3 Export Diversification and Structural Change	13
4.	Methods	13
5.	Data	16
6.	Results	16
	6.1 International Prices, Volumes, and Instability	17
	6.2 Malawi	21
	6.3 Tanzania	26
	6.4 Zimbabwe	29
7.	Conclusions	32
	Endnotes	38
	References	43

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1. INTRODUCTION

Malawi, Tanzania and Zimbabwe are highly dependent on export earnings from a narrow base of agricultural commodities. This dependence increased from the period 1961-1973 to the period 1974-1987. Agricultural commodity exports accounted for 91.1% of Malawi's, 78.2% of Tanzania's, and 43.3% of Zimbabwe's total export earnings during 1974-1987 (Table 1). Five agricultural commodities (the "Big-5") -- coffee, cotton, sugar, tea and tobacco -- accounted for 88.5% of Malawi's, 67.3% of Tanzania's, and 73.3% of Zimbabwe's agricultural export earnings during 1974-1987. Tobacco comprised 48.8% of Malawi's and 18.0% of Zimbabwe's, and coffee 31.4% of Tanzania's total export earnings during 1974-1987.

For Malawi, Tanzania and Zimbabwe the 1974-1987 period was also characterized by stagnant or declining real agricultural export earnings, and year-to-year instability (Figure 1). For each country, the real value of its agricultural exports was lower in 1987 than in 1977.

During 1974-1987, real world prices for the "Big-5" exports were unstable and downward trended (Figure 2), while overall world trade volumes in these commodities increased. Malawi, Tanzania and Zimbabwe, which are "small-country" producers of the "Big-5" export commodities, have, in general, lost international market shares during 1974-1987 (Table 2).

The instability and downward trend in export earnings are of extreme concern to policy makers. They tend to equate a narrow export commodity base with the instability and declines in earnings, and to propose export diversification as an expedient remedy.¹ Export diversification, by definition, involves changing the composition of a country's export mix. However, the impact of alternative export mixes on export earnings performance is unclear. In addition, diversification is

Figure 1. Index of Agricultural Export Earnings in Constant Prices, 1974=100.

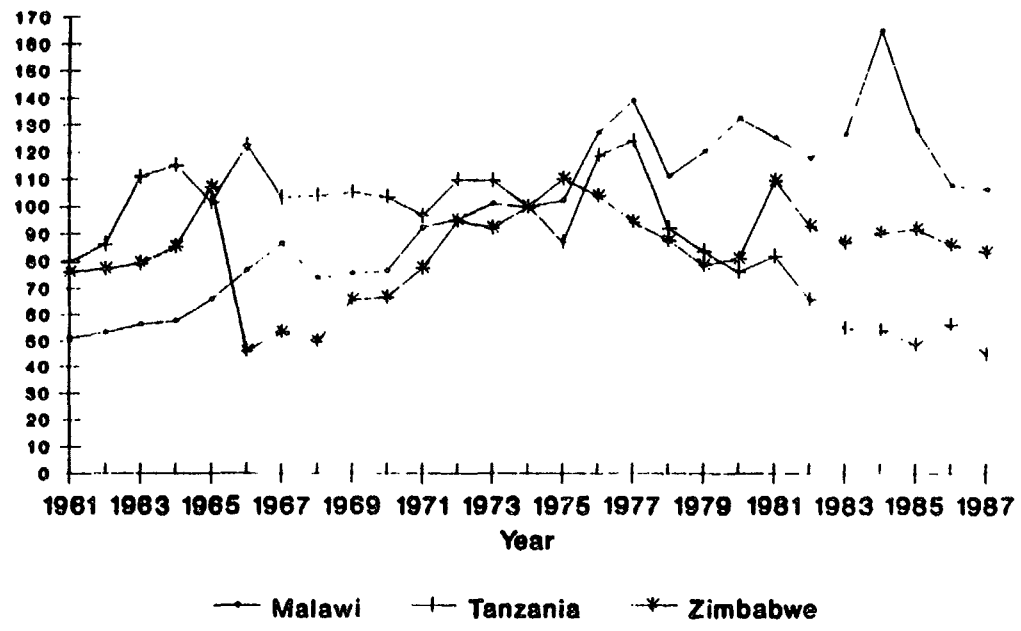


Table 1. Shares of selected agricultural exports for two time periods, Malawi, Tanzania, and Zimbabwe.

Year	Share Agr Exports Total Exports (%)	Shares of Agricultural Exports						Shares of Agricultural Exports					
		Coffee	Cotton	Sugar	Tea	Tobacco	"Big-5" Exports	Maize	Orchard	Sisal	Cashew	Beef	"Big-7" Exports
MALAWI													
1961-1973	89.9	0.3	4.7	0.6	27.1	42.5	75.1	3.3	11.9				90.3
1974-1987	91.1	1.4	1.2	12.1	19.2	54.7	88.5	2.1	4.1				94.8
TANZANIA													
1961-1973	78.6	18.4	18.6	0.1	3.1	2.4	42.5			19.8	7.9		70.2
1974-1987	78.2	40.2	15.5	1.2	5.4	5.0	67.3			7.1	5.9		80.2
ZIMBABWE													
1961-1973	36.1	0.3	6.0	7.1	0.8	52.8	67.0	8.5				16.1	91.6
1974-1987	42.8	3.8	15.7	10.6	2.2	11.1	73.3	8.7				8.7	90.7

Figure 2a. Index of World Commodity Prices, 1974=100.

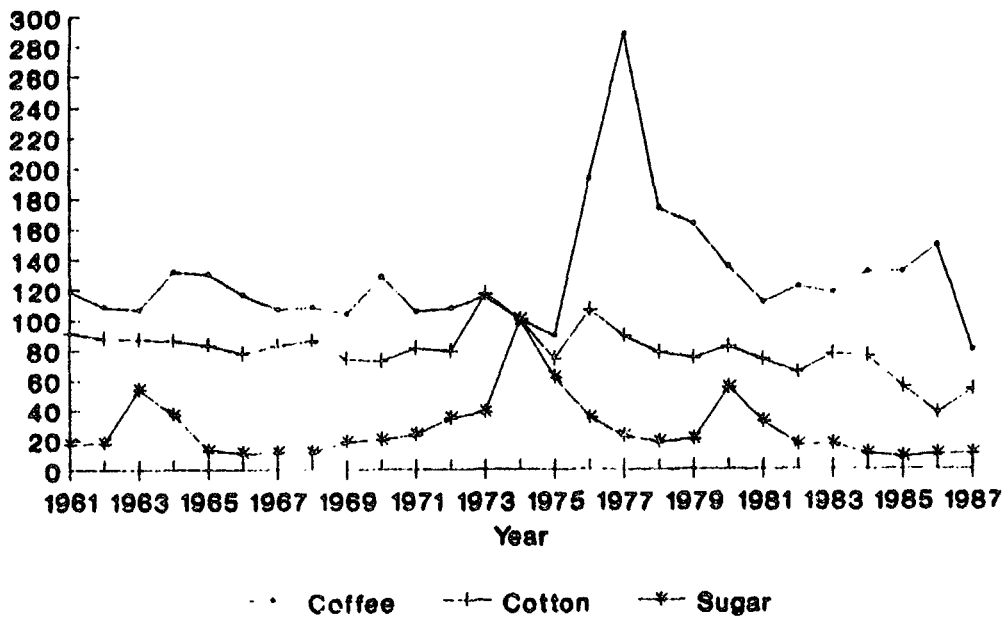


Figure 2b. Index of World Commodity Prices, 1974=100.

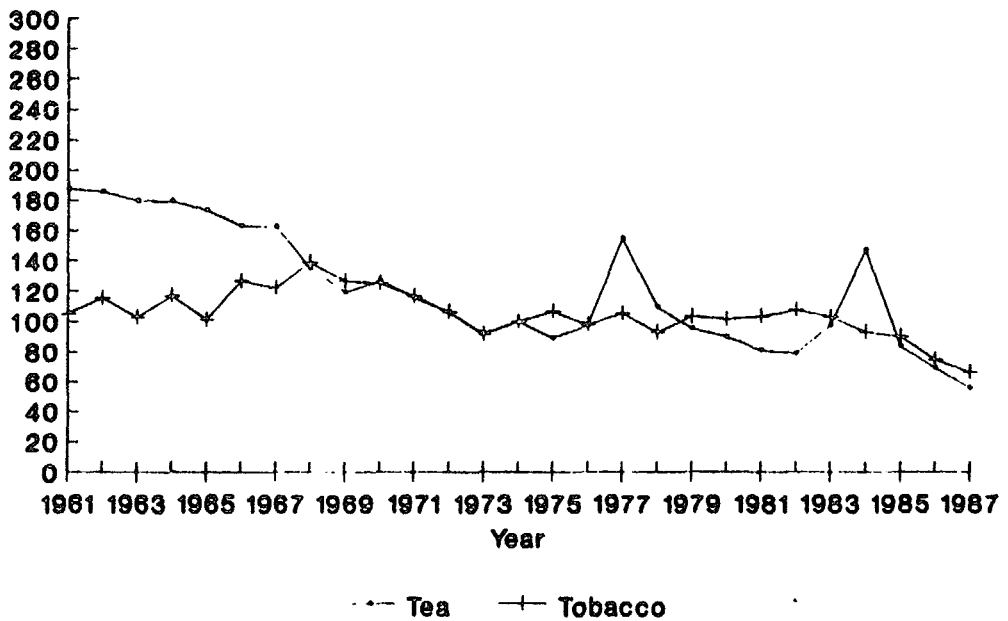


Table 2. Shares of World Markets for Big-5 Commodity Exports (%).

	Coffee	Cotton	Sugar	Tea	Tobacco
Malawi					
1961-73	0.01	0.25	0.03	5.1	4.5
1974-87	0.03	0.05	0.26	2.6	3.3
Tanzania					
1961-73	3.9	4.0	0.02	1.8	1.3
1974-87	1.6	1.1	0.05	1.5	0.6
Zimbabwe					
1961-73	0.04	0.9	0.4	0.43	18.4
1974-87	0.02	1.3	0.52	0.6	5.6
Total (Malawi, Tanzania, & Zimbabwe)					
1961-73	3.9	5.2	1.3	7.4	24.2
1974-87	1.8	2.4	0.8	4.6	9.5

directly related to the structure of the economy and how it changes as development proceeds; the relationship between economic structure, diversification, and export earnings growth and instability has to be considered. This paper analyzes the relationship between export diversification and export earnings growth and stability, and shows how alternative export diversification policies can help fulfill different policy goals.

A case study approach is used to analyze export performance in Malawi, Tanzania and Zimbabwe over the 1961-1987 periods. The analysis focuses on diversification among commodities in the existing export mix, and the policy goals of export earnings stability and growth, at the country level of analysis.²

The remainder of the paper is organized as follows. Section 2 provides an overview of the complexities inherent in designing diversification policies, and Section 3 then reviews the measures of export performance and diversification used in the analysis. Section 4 outlines the method of analysis. Section 5 describes the data used in the analysis and is followed by Section 6 which presents results of the analysis. Section 7 contains a summary of the results and some of the implications of the work.

2. EXPORT DIVERSIFICATION - AN OVERVIEW

A diversified national trade portfolio can help achieve stability-oriented and growth-oriented policy goals. It can lower instability in export earnings by providing a broader base of exports, and enhance growth by substituting commodities with positive price trends for those with declining price trends, through increasing value-added of export commodities by additional processing and marketing, and by substituting domestic production of food commodities and industrial raw material commodities for imports. Different production and export mixes will help achieve different policy goals, and there

are potential trade-offs between the growth and stability of export earnings. Because of these tradeoffs, diversification can not be considered a panacea.

The process of export diversification may seem, at first, to contradict the concept of comparative advantage. Specialization in activities in which a country has comparative advantage can lead to greater allocative efficiency. Trade theory argues that the more a country becomes involved in international markets, the more specialized it becomes. At the same time, specialization in a narrow group of exports can conceivably lead to increased instability in export earnings. The production and trade of a variety of commodities (a diverse export mix) can potentially stabilize a country's economic performance, however, this stability might be achieved at the expense of benefits associated with specialization.

Export diversification can take different forms, has different dimensions, and can be analyzed at different levels. Export diversification can be achieved either by adjusting shares of commodities in the existing export mix, or by adding new commodities to the export mix.³ There are both horizontal and vertical dimensions to export diversification. Horizontal diversification involves adjustments in the export mix in order to counter international price (or export quantity) instability or decline. Vertical diversification involves creating additional uses for existing and new commodities through value-added activities such as processing and marketing. Vertical diversification can expand market opportunities for raw materials which enhance growth and lead to more stability since processed goods tend to have more stable prices than raw commodities (although a higher multiplier could lead to greater instability).

These different dimensions of diversification are related to the market orientation and degree of processing of different export commodities. Some exports are oriented primarily towards international markets (e.g., coffee, tea, tobacco) with minimal processing, and others are oriented towards both international and domestic markets (e.g., cotton, sugar, food staples) either in raw or

processed forms. The latter group, called import substitutes, has greater market flexibility (which tends to stabilize domestic production), and can also be used as inputs for vertical diversification (which can lead to growth in production and exports).

Export diversification can be analyzed at many different levels (farm-, country-, and region-level impacts). Various measures, which correspond to different definitions or concepts of export diversification, can be used to evaluate the export mix (Bond and Milne; MacBean and Nguyen; Siegel; Svedberg). This has led to confusion about the types of problems that can be remedied by export diversification, and the design and implementation of export diversification policies.

The trade-offs between export earnings growth and stability, the different forms, dimensions, market-orientation, and levels that export diversification can take, and the different means of combatting decline and instability in export earnings precipitate the need to closely consider various export diversification policies. A summary of the different alternatives for export diversification, broken down by major policy goal (stability vs. growth) and the dimension that the diversification takes (horizontal vs. vertical) is presented in Figure 3. The country level analysis in this paper focuses on horizontal diversification among existing commodities in the export mix.

3. MEASURES OF EXPORT PERFORMANCE AND DIVERSIFICATION

The two measures of performance used in the analysis are growth and stability of volumes (produced and exported), values and prices. The average annual percent growth (or decline) of variables is calculated using a linear trend. Instability is calculated as percent deviations from the trend using a coefficient of variation.

A linear growth trend⁴ was chosen for a number of reasons. First, the objective in calculating the trend is to describe the data and not to develop an elaborate forecasting model. Second, linear extrapolations are often used by planners to evaluate expected outcomes, and deviations from these trends can be called instability. Third, there are no a priori reasons to assume exponential or higher order polynomial trends, especially given the short time series used in the analysis. Finally, the use of

Figure 3. The Goals, Dimensions and Forms of Export Diversification at the Country Level of Analysis.

DIMENSION	GOAL				
	Stability-oriented		Growth-oriented		
	Based on Existing Commodities	Add New Commodities	Based on Existing Commodities	Add New Commodities	
Horizontal Diversification	Adjust export shares based on covariation of export earnings from individual commodities.	Add new commodities (and possibly dispose of existing commodities) based on covariation of export earnings from individual commodities.	Adjust export shares based on growth rates of export earnings from individual commodities.	Add new commodities based on growth rates of world prices.	Add new commodities based on market niche.
Vertical Diversification	Adjust export shares based on a commodity's ability to be marketed in raw or processed forms in both international and domestic markets.	Add new commodities based on their flexibility to be marketed in raw and processed forms, and to serve international and domestic markets.	Introduce or expand value-added activities and import substitution.	Choose new commodities based on value-added and import substitution potential.	

a linear trend for all data series guarantees consistency in the comparison of growth and instability between different commodities.

When constructing a measure of instability based on deviations from a systematic trend, it is implicitly assumed that the trend itself is predictable and not a source of instability. The coefficient of variation (CV)⁵, a unit-free measure of percentage deviations from the trend, is a descriptive measure of instability. Because of its simplicity, the CV is widely used (Hazell et al.; Knudson and Nash).

Horizontal diversification is reflected in this paper by indices of concentration, which measure the distribution of export shares, the portfolio variance, which explicitly considers the interactions between export share and their effect on instability, and the share of agricultural exports in total exports, which indicates a country's stage of economic development. Vertical diversification is measured by examining the formation of forward and backward linkages with the agricultural and non-agricultural sectors.

3.1 EXPORT CONCENTRATION

The degree of diversification can be considered a function of both the number of commodities in a country's export mix, and the distribution of their individual shares. When using measures of export earnings concentration to describe the degree of diversification it is assumed that a lower concentration or wider variety of exports will lead to increased stability or growth in export earnings. Attention is usually focused on the hypothesized relationship between variety and stability.

Popular measures of export concentration include concentration ratios, the ogive index, the entropy index, and the Gini-Hirschman index (Bond and Milne; Schmitz; Siegel; Svedberg).⁶

Concentration ratios, the shares of a country's top agricultural exports in total agricultural exports,

give a clear and simple indication of the degree of export concentration. A diversified export mix would have a low share of earnings concentrated in a few commodities.

The ogive index measures deviations from an equal distribution of export shares among commodities. It can be expressed as:

$$Ogive = \sum_{n=1}^N \frac{(X_n - 1/N)^2}{1/N} \quad (1)$$

where N is the total number of export commodities being considered, 1/N is assumed to be the "ideal" share of export earnings for each commodity, and X_n is the actual share of commodity n in total exports. "Perfect diversification" is defined as an equal distribution of export shares among commodities (X_n equals 1/N for each commodity), and the ogive index equals zero. A more unequal distribution of export shares results in a higher ogive measure. Export diversification in this context means a more equal distribution among export commodities.⁷

3.2. PORTFOLIO VARIANCE

The group of a country's export commodities can be considered its "export portfolio". Export diversification in the context of the portfolio variance refers to reducing the instability of total export earnings brought upon by varying the relative export shares of different commodities (Kerr; Siegel).

The portfolio variance can be written as:

$$V = \sum_{i=1}^N w_i^2 VAR(X_i) + \sum_{i=1}^N \sum_{j=1, j \neq i}^N w_i w_j COV(X_i, X_j) \quad (2)$$

where W_i is the export share of commodity i , $\text{VAR}(X_i)$ is the variance of export earnings for commodity i , $\text{COV}(X_i, X_j)$ represents the covariance in export earnings from commodities i and j , the sum of W_i equals 1, and all W_i are non-negative.⁸ The first term in equation (2) is the non-diversifiable risk and the second term is diversifiable risk. Covariances are fundamental for export diversification strategies that are aimed at hedging against lower the risk of earnings instability.⁹ If export earnings from commodities i and j are negatively correlated, this covariance lowers the overall variance of the export portfolio.

Unlike measures of export concentration, the portfolio variance includes the contribution of each commodity's share (i.e. the W_i and W_j weights) to the total instability of export earnings. As export shares change, the weights associated with individual variances and covariances change; these changing weights affect the total portfolio variance. Use of the portfolio variance allows the comparison of the impact of alternative export diversification strategies by examining their effect on instability. By choosing commodity mixes carefully and examining covariances (correlations), the portfolio variance can be minimized.¹⁰

The portfolio variance approach to export diversification is implicitly based on the objective function of a risk averse policymaker whose sole objective is to minimize the instability of export earnings.¹¹ Accordingly, stable decline and stable growth would be equally preferred outcomes. Alternatively it could be claimed that this approach is based on the assumption that a country's growth rates in export earnings are satisfactory, or that instead of a growth-stability trade-off, export earnings growth and stability from individual commodities are positively correlated. These assumptions have important policy implications, because if a country's export earnings growth is satisfactory or growth and stability are complementary, policymakers might focus on stability as the policy goal.¹²

3.3. EXPORT DIVERSIFICATION AND STRUCTURAL CHANGE

Structural diversification is the process of economic transformation as resources are shifted within the agricultural sector to higher value activities, and out of agriculture into manufacturing and services. With structural diversification there is a broadening of intersectoral relationships (Barghouti, et al.). As the manufacturing and service sectors develop, there is greater potential for value-added activities. Although value-added activities can contribute to a growth-oriented export diversification strategy, they could increase instability due to the multiplier effect. On the other hand, export earnings stability might increase because prices of processed goods tend to be less volatile than prices of raw commodities. The distinction between foreign market oriented exports and import substitute exports, and the degree of value-added potential is important. Import substitutes, especially those used as inputs for producing non-agricultural products (e.g., cotton and textile manufacturing) have greater market flexibility (to increase stability), and potential for market expansion (which improves growth).

In contrast to the concentration measures and portfolio variance which are based on horizontal diversification, this view of diversification has both horizontal and vertical dimensions. Thus, there is no single-value measure to reflect structural diversification. The share of agricultural commodity exports in total exports is one indicator of the horizontal dimension of structural diversification. In this context a lower or declining share of agricultural commodity exports would be associated with a higher degree of structural diversification.

4. METHODS

The subsequent methods are used to examine the need for and potential for stability and growth-enhancing diversification. In order to determine the appropriate goals for different kinds of export diversification policies in the case study countries, trends and CV's are calculated, and the

sources of growth and stability are analyzed. The conditions for enhanced export earnings growth and stability through diversification are then examined.

The value of export earnings is, by definition, a multiplicative relationship between the volume and unit values of commodities exported. The CV for volume and unit value for each commodity are compared to determine their relative contributions to export earnings instability (Bond and Milne; Glezakos).¹³ Within and between sub-period analyses of CV and trend for export value, export volume and export unit value are conducted to assess the sources of instability and decline.¹⁴ Comparisons between the trend and instability of export volume and domestic production are conducted to assess whether domestic production is driving the observed trends and fluctuations in volume exported. If, for example, exports of a key crop are extremely unstable (or declining) while domestic production is stable (or growing), domestic demands or government marketing practices may be the cause.

If domestic demands are the cause of export volume instability it is possible that export earnings instability (and decline) might not be a problem (or secondary to other policy goals). If government-induced distortions are at fault, increased diversification could be an expensive means of achieving export earnings stability or growth. These goals could be achieved more efficiently by a reform of the offending policies.

To evaluate each country's potential for stability-oriented export diversification, the correlation coefficients of international commodity prices are calculated for each sub-period, and compared between periods. In order to measure the potential for growth-oriented export diversification, the growth rates of international commodity prices and export volumes are compared for each sub-period. Country-by-country analysis of shares of world markets for key exports provides indications of performance relative to the rest of the world.

Following the analysis of trends and instability of individual commodities, the relationship between various measures of export diversification and export earnings growth and instability is investigated. Export concentration ratios are calculated as shares of each country's one and two leading agricultural commodity exports, along with shares of the "Big-5" and "Big-7" exports in total agricultural exports. The ogive index is calculated as the distribution of export earning shares within the "Big-5", "Big-7", and "Big-7 and others" (the others share was calculated as 100% minus the "Big-7" share).

Two measures of the portfolio variance measure are constructed for the "Big-5" exports. One is an export share-weighted portfolio of international prices (PVPRICE), and the other is an export share-weighted portfolio of export earnings (PVEARN). The W_i s and W_j s in each portfolio are shares of coffee, cotton, sugar, tea and tobacco export earnings in a country's "Big-5" export earnings, and X_i , X_j 's are international prices (for PVPRICE) or export earnings (for PVEARN). The resulting measures reflect the share-weighted variability of export prices a country faces, and the share-weighted variability of export earnings. The former measure reflects price-risk only, and the latter measure reflects the interaction between price and yield-risk. This differentiation is akin to the comparison of unit value and volume sources of instability for individual commodities.¹⁵

The effect of changes in the export mix on export earnings instability is evaluated by constructing the portfolio variance with different export share weights. Both 1961-1973 and 1974-1987 weights (shares) are used for 1961-1973 and 1974-1987 price and earnings covariances. A comparison of these portfolios shows what the portfolio variance would have been if prices or export earnings varied as they did from 1974-1987 and export shares were equal to the 1961-1973 or 1974-1987 averages.

5. DATA

Trends and instability in agricultural export earnings (for individual commodities and as a group) are examined over the period 1961-1987, which is divided into two sub-periods: 1961-1973 ("first period") and 1974-1987 ("second period").¹⁶ For each country, in the analysis, its major foreign market oriented exports are coffee, tea and tobacco, and major import substitute exports are cotton and sugar (the "Big-5"). Two additional agricultural import substitutes are considered for Malawi (maize and groundnuts), Tanzania (sisal and cashew), and Zimbabwe (maize and beef), which together with the "Big-5" commodities give each country's "Big-7" exports.

Data on export values in \$U.S., volumes in metric tons, and domestic agricultural production in metric tons come from a computerized FAO database.¹⁷ Export unit values are calculated by dividing export values by volume, which gives an f.o.b unit value \$US per metric ton.¹⁸ Aggregate world trade data, volumes in metric tons, are taken from various FAO Trade Yearbooks. Data on world commodity prices are from publications by the World Bank's International Economics Department, International Commodity Markets Division.

Nominal prices in \$US are converted to constant prices in 1985 \$US by using the manufacturing unit value (MUV) Index.¹⁹ Data on MUV are from publications by the World Bank's International Economics Department, International Commodity Markets Division.

6. RESULTS

The first results presented deal with international commodity markets. Trends and instability of international commodity prices, and volumes traded set the stage for the country specific analysis, since world market conditions directly affect each country's potential for export earnings growth and stability. Following the evaluation international conditions, each country's performance will be evaluated and compared to the world market conditions.

6.1 International Prices, Volumes and Instability

Table 3 shows the coefficients of variation (CV) and percent rates of growth for world commodity prices for the two periods. The price trends were not favorable for exporters, especially for those who export tea and maize, whose prices registered 3.4% and 2.2% annual declines respectively from 1961-1987. During the second period, prices of all commodities exhibited strong downward trends. Sugar, sisal, cotton and groundnuts fell the most from 1974-1987 with annual average declines of 15.5%, 7.8%, 4.8% and 4.6% respectively. These downward trends and increased instability for world commodity prices during 1974-1987 were characteristic of most agricultural commodities, not just the major exports of Malawi, Tanzania and Zimbabwe (Akiyama and Larson; Hazell, et al.).

Price instability grew from the first to the second period for beef, coffee, cotton, groundnuts, maize, tea and sugar. Only sisal and tobacco prices showed lower instability during the second period. Tobacco, cotton and tea had the most stable international prices over the entire (1961-1987) period.

World price declines and increased price instability were accompanied by increases in world volumes traded, especially for the "Big-5" commodities. Sugar and tea volumes increased most among all commodities from the first to the second period. International markets for all "Big-5" commodities were clearly expanding, even as prices declined. The levels of world volume instability were naturally much lower than the volume instability for individual countries (compare Table 3 with individual country Tables 5, 9 and 10)

The negative price trends mean that growth in export earnings from the "Big-5" commodities is possible, but only if volumes exported grow substantially. At the same time that export volume growth is considered, the country should examine its domestic production capabilities; increased

Table 3. Coefficients of Variation and Trends for World Commodity Prices and Volumes, 1961-82.*

	1961-1973		1974-1987		1961-1987	
	Volume	Price	Volume	Price	Volume	Price
Beef	6 (6.3)	6 (49)	5 (4.6)	14 (-1.6)	7 (5.1)	21 -1.2
Coffee	4 (2.4)	9 (-0.5)	6 (2.2)	37 (-2.6)	6 (1.6)	31 (0.7)
Cotton	5 (1.5)	13 (-0.2)	7 (1.7)	15 (-4.8)	7 (1.0)	17 (-1.3)
Groundnuts	14 (-3.9)	11 (1.4)	11 (-4.8)	36 (4.6)	15 (-3.0)	30 (-0.4)
Maize	14 (7.5)	12 (-0.2)	14 (1.3)	19 (-6.4)	19 (5.3)	19 (-2.2)
Sisal	5 (-2.1)	35 (-4.2)	17 (-7.6)	32 (-7.8)	13 (-5.8)	40 (-1.5)
Sugar	6 (1.7)	58 (1.1)	7 (1.7)	62 (-15.5)	7 (2.1)	78 (-1.0)
Tea	3 (2.8)	5 (-5.6)	3 (2.5)	27 (-2.5)	4 (2.6)	19 (-3.4)
Tobacco	6 (2.5)	12 (0.1)	4 (0.2)	10 (-2.0)	7 (2.0)	11 (-1.3)

*Trends were derived from a linear regression of price on time, converted into own average annual rate of growth.

returns to factors of production can only be brought about by increasing productivity or by lowering marketing costs.

Correlations between detrended world commodity prices for the two sub-periods, and for 1961-1987 are found in Table 4. These correlations can be used to design an instability-reducing portfolio of exports for each country. Commodities whose price deviations are negatively correlated with the existing mix are good candidates for inclusion in the portfolio. A cursory review of Table 4 reveals some of the pitfalls associated with designing instability-reducing export portfolios. Because of the large number of potential changes that can take place in a portfolio, each change needs to be evaluated relative to its impact on the overall portfolio variance. Even if the "best" portfolio variance-reducing changes to the export mix are identified, the structure of international price variability changes over time (Table 4). An example is cotton, whose price instability correlations with tobacco, wheat and sugar changed in sign from period to period. Designing a variance-reducing portfolio based on a short time series of international price variations can lead to faulty policy prescriptions in a changing world environment. More analysis is needed to determine whether long-term international price covariances are stable; long-term stability will enhance the desirability of developing instability-reducing portfolios.

In general, World Bank commodity projections indicate that downward or stagnant world price trends, and year-to-year instability for the "Big-5" export commodities, and most other agricultural commodities will continue (Akiyama and Larson). This means that the case study countries will need to focus their attention on identifying their comparative advantage, and improving productivity and lowering costs by using appropriate policies, and investing in infrastructure and support services.

Table 4. Correlations Between World Price Instability for Major Agricultural Commodities, 1961-1987^a

	<u>Beef</u>	<u>Citrus</u>	<u>Coffee</u>	<u>Cotton</u>	<u>Grains</u>	<u>Maize</u>	<u>Sisal</u>	<u>Sugar</u>	<u>Tea</u>	<u>Tobacco</u>	<u>Wheat</u>
<u>Beef</u>											
1961-73	1.0										
1974-87	1.0										
1961-87	1.0										
<u>Citrus</u>											
1961-73	.43	1.0									
1974-87	.64 ^{ns}	1.0									
1961-87	-.14	1.0									
<u>Coffee</u>											
1961-73	.31	.67	1.0								
1974-87	-.11	.01	1.0								
1961-87	-.16	-.16	1.0								
<u>Cotton</u>											
1961-73	.13	-.37	.04	1.0							
1974-87	.35	-.11	.17	1.0							
1961-87	.27	-.56 ^o	.28	1.0							
<u>Grains</u>											
1961-73	.15	-.38	.45	.66	1.0						
1974-87	-.27	-.54 ^o	-.11	-.26	1.0						
1961-87	.85	-.54 ^o	.09	.26	1.0						
<u>Maize</u>											
1961-73	.38	-.31	.38	.58 ^o	.58 ^o	1.0					
1974-87	.06	-.21	-.49	.33	-.03	1.0					
1961-87	.20	-.57 ^o	-.04	.66 ^o	.35	1.0					
<u>Sisal</u>											
1961-73	-.18	.57 ^o	.13	.72 ^o	.51	.72 ^o	1.0				
1974-87	.09	-.25	-.56 ^o	.00	.53	.70 ^o	1.0				
1961-87	-.23	-.49 ^o	-.03	.49 ^o	.53 ^o	.69 ^o	1.0				
<u>Sugar</u>											
1967-73	-.57 ^o	-.64 ^o	-.03	.37	.27	.34	.84 ^o	1.0			
1974-87	.01	-.27	-.70 ^o	-.04	.44	.51	.83 ^o	1.0			
1961-87	-.05	-.64 ^o	-.13	.47 ^o	.56 ^o	.66 ^o	.84 ^o	1.0			
<u>Tea</u>											
1967-73	.01	.03	.36	-.28	-.22	.09	-.11	-.19	1.0		
1974-87	.03	-.03	.61 ^o	.41	-.26	.13	-.15	-.43	1.0		
1961-87	-.45 ^o	.30	.44 ^o	-.10	-.36	-.18	-.08	-.38 ^o	1.0		
<u>Tobacco</u>											
1967-73	.37	.64 ^o	-.18	-.63 ^o	-.79 ^o	-.38	-.67 ^o	-.58 ^o	.11	1.0	
1974-87	.37	.60 ^o	.05	.14	-.78 ^o	-.13	-.19	-.20	.25	1.0	
1961-87	.42 ^o	.24	.01	-.07	-.39 ^o	.08	-.35	-.15	-.07	1.0	
<u>Wheat</u>											
1961-73	.40	-.30	.16	.90 ^o	.59 ^o	.81 ^o	.75 ^o	.30	-.09	-.48	1.0
1974-87	.01	.21	-.71 ^o	-.04	.28	.84 ^o	.88 ^o	.80 ^o	-.31	-.08	1.0
1961-87	.12	-.52 ^o	-.16	.61 ^o	.50	.88 ^o	.82 ^o	.76 ^o	-.34	-.10	1.0

^aCorrelations between deviations from linear trend.

^{ns} represents a p value of < .05, and are thus nominally "significant" correlations.

6.2 Malawi

Malawi's agricultural export earnings grew strongly during the first period and were relatively stable around the trend (Table 5). From 1974-1987, agricultural export earnings growth declined from 5.4 to 0.7 percent annually, and instability increased from 8 to 14 percent. The slower rate of export earnings growth can be attributed mostly to declining world prices. Both export volume and domestic production growth for the "Big-5" commodities remained strong from 1974-1987.

In 1961-1973, export volume instability was greater than unit value instability for all of Malawi's export commodities. Domestic production was relatively unstable during this period. If greater stability in export earnings were desired, efforts to stabilize domestic production, such as horizontal diversification programs with a focus on yield risk or reform of marketing policies, should be preferred to horizontal diversification based on international price covariances.

From the first to the second period, export volume instability rose for all commodities except sugar (sugar exports were highly unstable during the first period because Malawi was just beginning to enter the export market). Production instability was generally lower for the second period, though coffee and beef production became more unstable. Unit value instability increased at a greater pace than export volumes, to the point that unit value instability became greater than volume instability for tea, and the two sources of instability were approximately equal for tobacco and sugar. Thus, a price-based stabilization program had more potential during this second period.

Cotton's share of agricultural exports fell from 4.7% to 1.2%, largely due to sharply declining world prices. In both periods, however, the instability of domestic cotton production was lower than the instability of volume exported, and the share of textile and clothing value-added in manufacturing increased from 17% in 1970 to 21% in 1987. This indicates that Malawi has tended to allocate more of its cotton production to domestic value-added activities as a hedge against unstable

Table 5. Variability and growth rates for export volumes, values, and unit values and domestic production of commodity exports for Malawi.^a

	1961-73				1974-87			
	Volume	Value	Unit Value	Production	Volume	Value	Unit Value	Production
Coffee	28 (2.2)	34 (2.6)	16 (0.2)	23 (5.5)	61 (23.8)	59 (20.0)	39 (-5.0)	47 (15.6)
Cotton	50 (8.2)	44 (5.4)	13 (-2.8)	25 (4.6)	90 (6.0)	81 (-7.2)	30 (-9.3)	28 (3.5)
Sugar	157 (33.3)	201 (35.8)	23 (7.0)	39 (25.1)	30 (6.6)	49 (-1.1)	30 (-10.0)	18 (6.7)
Tea	8 (5.3)	8 (0.9)	5 (-4.2)	9 (5.0)	7 (2.9)	36 (-0.1)	30 (-3.0)	10 (2.8)
Tobacco	12 (7.0)	12 (7.8)	11 (0.6)	23 (5.9)	17 (5.7)	14 (1.6)	18 (-5.1)	11 (5.9)
Groundnuts	40 (5.0)	34 (4.5)	12 (-1.3)	10 (3.3)	52 (-0.6)	50 (-9.7)	34 (-3.7)	3 (7.6)
Maize	103 (6.6)	98 (7.5)	27 (2.2)	12 (4.1)	137 (19.1)	148 (16.3)	84 (-16.4)	10 (9.0)
Total Ex-ports		8 (5.4)				14 (0.7)		

^aCVs for instability and average annual growth (in parenthesis).

Table 6. Measures of Agricultural Commodity Export Concentration, Malawi, Tanzania, Zimbabwe.

A. Concentration Ratios

	Top-1	Top-2	Big-5 ^a	Big-7
<u>MALAWI</u>				
1961-1973	43 (tobacco)	70 (tobacco & tea)	75	90
1974-1987	55 (tobacco)	74 (tobacco & tea)	89	95
<u>TANZANIA</u>				
1961-1973	20 (cashew)	38 (cashew & cotton)	43	70
1974-1987	40 (coffee)	56 (coffee & cotton)	67	80
<u>ZIMBABWE</u>				
1961-1973	53 (tobacco)	69 (tobacco & beef)	67	92
1974-1987	41 (tobacco)	57 (tobacco & cotton)	73	91

B. Ogive Measure of Concentration

	Big-5	Big-7	Big-7 & Others
<u>MALAWI</u>			
1961-1973	1.3	1.1	1.3
1974-1987	1.2	1.3	1.8
<u>TANZANIA</u>			
1961-1973	0.9	0.6	0.6
1974-1987	1.1	1.7	0.9
<u>ZIMBABWE</u>			
1961-1973	2.2	1.7	1.6
1074-1987	0.9	0.9	0.8

^aBig-5 refers to the ogive measure calculated with N equal to 5 (equation 1), Big-7 has N equal to 7 where the additional two commodities included vary from country to country (see table 1). Big-7 and others include all commodities (N equal to 8, where the 8th commodity is "all others").

and declining world prices. This diversion of cotton is evidence of vertical integration. An evaluation of changes in value-added through textile processing is beyond the scope of this study.

Concentration ratios, and the ogive measures of concentration, are presented in Table 6. Malawi showed a clear increase in concentration between the two sub-periods for its largest, two largest, "Big-5", and "Big-7" agricultural export commodities. The ogive measure shows that the share distribution remained roughly the same among the "Big-5" commodities. Because, however, the "Big-5" share increased so much (from 75 to 89%), the "Big-7" and the "Big-7 plus others" measures showed a less equal distribution. Overall, Malawi's exports became more concentrated in a small group of commodities.

During the first period, Malawi's strong concentration in two exports with very stable international prices (tobacco and tea) led to a very low level of export earnings instability. This stability is reflected by an extremely low export earnings portfolio variance (PVEARN), compared to the other two countries (Table 7). Given this low level of instability, during the second period Malawi was able to concentrate on maintaining its growth in earnings rather than attempting to lower instability. It became more concentrated in a small number of exports, increasing dramatically the share of sugar in total exports²⁰, and its earnings (PVEARN) and price (PVPRICE) instability consequently increased (Table 5, Table 7).

The changes Malawi underwent from the first to the second period had an impact on its two measures of portfolio variance. PVPRICE increased nearly 4-fold (from 0.98 to 3.72), and Malawi would have had a lower value (2.54) of PVPRICE had it maintained its first period shares. PVEARN shows, however, that the country was able to stabilize its export earnings by stabilizing export volumes. Thus, PVEARN increased only 3-fold (from 0.71 to 1.97), and the new mix was better than the old in terms of PVEARN (1.97 compared to 3.53). Thus, although instability increased, the new mix was better than the old in terms of total export value instability.

Table 7. Five Commodity Portfolio Variances for Malawi, Tanzania, and Zimbabwe.

		Portfolio Variances			
		Export Earnings (PVEARN)		World Prices (PVPRICE)	
		By Covariations		By Covariations	
		1961-1973	1974-1987	1961-1973	1974-1987
Malawi					
By Shares	1961-1973	.71	3.53	.98	2.54
	1974-1987	8.46	1.97	.60	3.72
Tanzania					
By Shares	1961-1973	2.62	5.71	.48	5.76
	1974-1987	2.23	7.40	.41	6.98
Zimbabwe					
By Shares	1961-1973	14.61	2.95	.46	3.43
	1974-1987	11.94	2.00	.48	4.57

Malawi was able to sustain a moderate level of export earnings growth, and its earnings instability remained relatively low. This occurred despite declines and increased instability of world prices. In fact, Malawi has a strong potential for further growth-oriented export expansion, since the world trade volumes for the "Big-5" commodities are growing. Malawi's share of world markets declined for tobacco, tea and cotton, and increased for coffee and sugar. However, Malawi's share of world coffee and sugar exports remained quite low (Table 2).

In terms of structural diversification, Malawi became less diversified as the share of agricultural export earnings grew from 89.9 to 91.1 percent of total exports. Compared to Tanzania and Zimbabwe, in both periods Malawi was the least diversified according to this measure of structural diversification. However, Malawi's agricultural export growth was highest in both periods.

6.3 Tanzania

Tanzania's agricultural earnings grew at a moderate pace during 1961-1973 despite a relatively favorable world price environment (Table 8). This weak growth turned into a steep decline during the second period, and, at the same time, instability increased. As international prices for its key export commodities (coffee, cotton and sisal) declined strongly during the second period, production and exports of both coffee and sisal fell, and cotton production stagnated and export volumes declined. The combination of unfavorable international price trends and declining production of export commodities produced an alarmingly steep drop in export earnings. The potential for export expansion exists, Tanzania's share of world markets for "Big-5" (and "Big-7") commodities declined significantly from the first to the second period for all commodities but sugar (Table 2).

Table 8 shows that, during 1974-1987, resources were diverted from export commodities to import substitutes. Production of major food import substitutes (maize and beef) grew strongly, and cotton tended to be diverted from export markets to domestic use. The share of cotton export

Table 8. Variability and growth rates for export volumes, values, and unit values and domestic production of commodities for Tanzania.^a

	1961-73				1974-87			
	Volume	Value	Unit Value	Production	Volume	Value	Unit Value	Production
Coffee	18 (6.3)	19 (5.7)	10 (-0.5)	16 (2.5)	14 (0.5)	38 (-2.2)	40 (-2.6)	14 (-0.6)
Cotton	22 (3.9)	22 (2.1)	5 (-2.1)	17 (4.6)	17 (-3.3)	25 (-8.8)	18 (-5.5)	26 (0.2)
Sugar	180 (-18.3)	180 (-18.4)	58 (5.5)	9.5 (7.1)	53 (-1.9)	76 (-8.0)	26 (-7.5)	12 (-0.2)
Tea	7 (8.3)	15 (2.0)	6 (-6.2)	11 (9.0)	15 (2.0)	22 (-2.6)	23 (-4.3)	11 (1.4)
Tobacco	21 (14.7)	24 (15.9)	21 (4.0)	18 (14.6)	25 (-5.6)	36 (-10.4)	19 (-5.0)	13 (-2.5)
Cashew	11 (8.3)	13 (7.4)	12 (-0.3)	9 (8.0)	36 (-18.3)	22 (-14.4)	37 (3.7)	22 (-30.4)
Sisal	11 (-3.5)	31 (-10.7)	31 (-7.2)	8 (-2.4)	18 (-12.8)	45 (-18.6)	34 (-6.7)	8 (-11.9)
Total Exports		11 (1.0)				16 (-6.8)		

^aCVs for variability and average annual percentage growth (in parenthesis).

earnings declined from 18.6% to 15.5%, but there was a slight positive growth trend in domestic production compared to a decline in export volume. Hence, a higher proportion of cotton production was diverted to domestic value-added activities. Textile and clothing's share of manufacturing value-added increased from about 9% in 1970 to about 18% in 1987.

In the first period, export volume instability was greater than unit value instability for coffee, cotton and sugar, the two sources of earnings instability were approximately equal for tea, tobacco and cashews, while unit value instability dominated for sisal. Unit value instability increased dramatically in the second period for all commodities except tobacco and sugar. Export volume instability generally declined during the second period, and production instability was fairly constant from period to period. In 1974-1987, unit value instability was greater than export volume instability for coffee, Tanzania's leading export, and sisal. Once again, earnings instability during both periods was fairly evenly attributable to volume and unit value instability, with volume instability being, in general, slightly larger.

Table 6 shows that, for both periods, Tanzania was the country with the lowest concentration of exports. Its share distribution (ogive measure) was lowest during 1961-1974, but the distribution became more unequal during the second period. This increased inequality is mainly attributable to the strong increase in coffee's share to 40.2% of agricultural export earnings.

With the increase in world price instability, Tanzania's portfolio variance of export earnings (PVEARN) increased dramatically in 1974-1987 (Table 7). The country appears to have done worse in terms of both growth and stability. In fact, had Tanzania maintained its first period shares during the second period, it would have lowered its overall portfolio variance of both export earnings (PVEARN) and international prices (PVPRICE). Table 7 shows that Tanzania would have lowered its portfolio variances (PVEARN, PVPRICE) in each period had it maintained the other periods'

shares. Hence, any planned effort by Tanzania to stabilize its export earning that might have occurred clearly failed.

In terms of structural diversification, Tanzania became slightly more diversified as the share of agricultural exports in total export earnings fell from 78.6 to 78.2 percent. Hence, Tanzania's non-agricultural export earnings declined at a rate similar to that of agricultural export earnings.

6.4 Zimbabwe

Zimbabwe's export earnings were stagnant and highly unstable during 1961-1973. In 1974-1987, export earnings declined, though earnings instability was markedly lower than in the first period. The declines in export earnings can be attributed to an unfavorable international price environment, since both production and export volumes grew strongly for most commodities during the second period (Table 9). Even so, there is potential for more export growth since its shares of world trade are still small for its expanding exports (Table 2).

In contrast to Malawi and Tanzania, cotton's share of Zimbabwe's agricultural export earnings increased sharply from 6.0% to 15.7%. During the second period Zimbabwe's cotton export volume was more stable and grew at about the same rate as domestic production, and the share of textile and clothing value-added in manufacturing was 16 percent in both 1970 and 1987. Thus, though Zimbabwe was able to lower export earnings instability through horizontal diversification, it was not successful in diversifying in a vertical direction.

In 1961-1973, the instability in volumes exported clearly dominated unit value instability in contributing to overall value instability. The decline in export volume instability from the first to the second period was due to sharp declines in export volume instability; unit value instability generally increased from 1961-1973 to 1974-1987. This decline in export volume instability seems to have

Table 9. Variability and growth rates for export volumes, values, and unit values, and domestic production of commodity exports for Zimbabwe.^a

	1961-1973				1974-1987			
	Volume	Value	Unit Value	Production	Volume	Value	Unit Value	Production
Coffee	76 (25.4)	83 (28.3)	31 (6.2)	79 (31.9)	22 (12.4)	30 (7.5)	31 (-4.2)	17 (11.1)
Cotton	48 (26.2)	50 (26.1)	19 (1.6)	43 (22.9)	12 (5.6)	18 (5.0)	15 (-4.4)	24 (4.7)
Tea	49 (11.3)	45 (5.4)	12 (-4.6)	12 (12.7)	15 (8.1)	35 (3.3)	25 (-5.0)	11 (7.9)
Tobacco	46 (-5.5)	45 (-8.4)	15 (-2.5)	27 (-4.5)	18 (3.3)	19 (2.6)	13 (-0.1)	16 (2.7)
Sugar	50 (7.7)	47 (7.0)	20 (-3.0)	22 (7.6)	14 (4.4)	45 (-4.3)	50 (-8.3)	10 (4.2)
Maize	54 (5.8)	60 (6.1)	43 (-2.8)	34 (6.5)	58 (-5.1)	51 (-8.7)	95 (2.8)	37 (-0.3)
Beef	10 (9.7)	14 (9.6)	10 (6.9)	2 (1.2)	50 (-12.5)	40 (-11.1)	26 (2.8)	13 (-4.5)
Total Exports		25 (0.3)				10 (-1.3)		

^aCVs for instability and average annual percentage growth (in parentheses).

resulted from efforts to stabilize domestic production. Production instability declined dramatically, especially for the "Big-5" exports.

Zimbabwe's concentration in the "Big-5" exports increased from the first to the second period, though this concentration was accompanied by a more even distribution among these commodities (Table 6). Tobacco's share declined dramatically, with cotton, coffee and sugar gaining shares (Table 1). The more even distribution among exports helped lower the overall portfolio variance (PVEARN) from 14.6 to 2.0 (Table 7). Table 7 shows, however, that the increased stability of export earnings was mainly caused by a stabilization of volumes exported; the share weighted portfolio variance of international prices (PVPRICE) increased from 1961-1973 to 1974-1987.

As can be seen by examining PVEARN computed using the first periods' shares with the second periods' covariances, the export diversification from 1961-73 to 1974-1987 did lead to a lower overall portfolio variance (2.00 compared to 2.95 with the first period shares). Thus, through exogenous factors lead to a higher variation (PVPRICE), the Zimbabwe was able to counter this instability by making internal adjustments.

In terms of structural diversification, Zimbabwe became markedly less diversified as the share of agricultural exports in total exports increased from 36.1 to 42.8%. But, compared to Malawi and Tanzania, Zimbabwe remained the most structurally diversified country by a wide margin.

The following is an account of the potential pitfalls of export diversification policies. During 1961-1973, Zimbabwe had a relatively high (25%) CV of agricultural export earnings (Table 9). If, at the end of 1973, the country had embarked on a program of horizontal diversification to reduce these fluctuations, the program might have backfired. The country's two largest sources of agricultural export revenues were tobacco and beef. The first period correlations of instability in world prices (Table 4) would suggest that cotton and sugar should be added to the export trade portfolio in

order to reduce instability.²¹ The price instabilities for these commodities were negatively correlated with those of tobacco and beef, and they were suitable for Zimbabwe's agroclimatic conditions.

The results of this attempt at export diversification would have been disastrous. Cotton and sugar prices registered steep declines in the second period, indicating that very large increases in volumes would have to be achieved in order to raise export values. In fact, Zimbabwe sugar exports increased by 4.4% during 1974-1987, yet sugar export earnings declined (Table 9).

In addition to the negative effect on export earnings, the move would not have reduced instability. Table 4 shows that during the second period, cotton price instability was positively correlated with both beef and tobacco price instability, and that sugar price instability was not significantly correlated with beef and tobacco instability. The efforts toward improved stability via horizontal diversification would have produced lower export earnings and more instability.

The changing structure of the economy, price forecasts, comparative advantage, as well as the costs of adjustment, have to be considered before beginning a process of horizontal diversification. Reactions to historical price movements can produce unexpected and undesirable results.

7. CONCLUSIONS

There is no single definition or measure of export diversification. This has led to confusion about the identification of problems that can be remedied by export diversification, and the design and implementation of export diversification policies. This paper analyzes the relationship between different measures of export diversification and export performance.

Agricultural export earnings growth and stability, and export diversification were analyzed for Malawi, Tanzania and Zimbabwe over the 1961-1987 period, divided into two sub-periods: 1961-1973 and 1974-1987. The countries' "Big-5" and "Big-7" export commodities were characterized by declining and unstable international prices, accompanied by increases in world volumes traded.

However, Malawi, Tanzania and Zimbabwe tended to lose international market shares, indicating that they have not fully exploited existing market opportunities.

For individual commodities, there were changes across the periods from favorable to unfavorable price trends, and there were shifts in the covariances of deviations from price trends. These changes complicate the design of export diversification policies especially policies which aim to stabilize export earnings. In general, although international commodity prices have fallen and instability has grown, the most effective way to achieve export earnings growth and/or stability may be to increase and stabilize agricultural production and the volume of exports.

The growth and stability of Malawi's and Zimbabwe's domestic production and exports offset, to some degree, the decline and instability of international prices. Malawi and Zimbabwe simultaneously increased the production of both foreign market-oriented exports and import substitute exports. In contrast, Tanzania's domestic production and exports reinforced the decline and instability of international prices. Although Tanzania increased domestic production of some import substitute exports, production of foreign market oriented exports stagnated or declined.

Overall, considering the decline and instability of international prices for "Big-5" commodities, it can be concluded that the agricultural sectors of Malawi and Zimbabwe performed fairly well. They are still, however, losing international market shares, indicating that they are lagging behind other countries.

Using several measures of horizontal export diversification of commodities in the existing export mix (measures of concentration, portfolio variance, and structure of exports), it was found that there is no clear relationship between the degree of export diversification and export performance in Malawi, Tanzania and Zimbabwe (see Figure 4, which summarizes the study's results).

Figure 4. The Relationship Between Export Diversification and Export Performance, from 1961-1973 to 1974-1987.

	Measures of Export Diversification ^a										Measures of Export Performance ^b	
	Concentration							Portfolio Variance		Structure of Exports	Export Earnings Growth	Export Earnings Stability
	Ratios				Ogive			Price	Export Earnings			
	Top-1	Top-2	Big-5	Big-7	Big-5	Big-7	Big-7+					
Malawi	less	less	less	less	more	less	less	less	less	less	less (positive trend)	less
Tanzania	less	less	less	less	less	less	less	less	less	slightly more	less (negative trend)	less
Zimbabwe	less	more	less	more	more	more	more	less	more	less	less (negative trend)	more

Notes:

^amore (less) = more (less) diversified from 1961-1973 to 1974-1987.

^bmore (less) = more (less) growth or stability from 1961-1973 to 1974-1987.

Malawi's agricultural export earnings became less diversified according to nearly all the measures, and export performance as measured by both growth and stability was less satisfactory during 1974-1987 than 1961-1973. However, compared to Tanzania and Zimbabwe, Malawi was able to achieve a modest level of export earnings growth despite an increasingly unfavorable international price environment. Increased production and exports of commodities counteracted downward price trends.

According to most of the measures of concentration, Zimbabwe's agricultural export earnings became more diversified and the stability of export earnings consequently increased. At the same time, export earnings began to decline. The tradeoff between growth and stability manifested itself here, since the portfolio variance of export earnings declined even as the international price matrix exhibited more instability. In terms of the structure of exports, both Malawi and Zimbabwe became less diversified as their dependence on agricultural export earnings increased, though Zimbabwe's share of agricultural exports in total value exported was less than one-half that of Malawi's (42.8% compared to 91.1%). This provides an indication that, despite the reasonable performance of their agricultural export sectors, the structure of the economy remains highly oriented toward agriculture.

Tanzania's agricultural export earnings became less diversified, and instability increased. In contrast to Malawi, this increase in instability was not accompanied by export earnings growth. Domestic production stagnated and declined for many commodities, and some traditional exports were diverted to domestic markets.

Citing the example of Kenya, which successfully filled a market niche for cut flowers, there have been numerous feasibility studies and proposals for export diversification for Malawi, Tanzania and Zimbabwe. Exports such as flowers, strawberries, citrus fruits, exotic horticultural crops and livestock-based products have been considered. These market niche enterprises tend to require high

levels of technological expertise, infrastructure and support services, which are only available to small elites in the agricultural sector.

The impact of new commodities was not considered in this analysis. In the 1990's the reality is that these countries' exports are concentrated on a narrow base of foreign market oriented exports (coffee, tea and tobacco), and import substitute exports (cotton, sugar, maize, and beef). The vital question that must be asked is whether the "Big-5" and "Big-7" export commodities which dominate the agricultural and total exports of Malawi, Tanzania and Zimbabwe are indeed the best choice in terms of comparative advantage and international price projections. With about one-half of Malawi's and one-fifth of Zimbabwe's total export earnings from tobacco, and about one-third of Tanzania's total export earnings from coffee, any future analysis should start with these commodities. There is a great deal of uncertainty about the impact of anti-smoking trends on tobacco consumption and international prices, and about the future of international coffee production and marketing arrangements.

More attention should be devoted to analyzing the potential for enhancing the growth and stability of export earnings through vertical diversification. In addition to its impact on the agricultural sector, vertical diversification can have important growth and stability impacts on the non-agricultural sectors. However, as pointed out there is some danger of increasing instability due to multiplier effects.

The results of the analysis indicate that instead of focusing attention on changing the composition of agricultural commodity exports, either as a hedge against fluctuations in international market prices or to shift into expanding markets, there is an urgent need to focus attention on the causes of unstable and declining (or stagnating) domestic production and exports. Some production instability can be attributed to unfavorable weather, pestilence and political disruptions, but domestic policy can also have an impact. Overvalued exchange rates, trade restrictions, producer price

controls, and the pursuit of self-sufficiency in basic foods instead of food-security based on domestic production and trade tend to affect incentives for production. Institutional impediments affecting support services such as marketing, input supply, credit, research and extension, and transport also lead to inefficiencies and increased uncertainty which affect the growth and stability of production. Finally, technological deficiencies in the agricultural sector, and linked manufacturing and service sectors can exacerbate existing problems.

This paper clearly points to the need for a comprehensive approach to export diversification policies that can simultaneously deal with the different policy goals (growth and stability), and dimensions of diversification (horizontal and vertical).

ENDNOTES

¹Examples of proposed export diversification programs for the countries are the following World Bank Staff Appraisal Reports: "Agricultural Marketing and Estate Development Project: Malawi", October 1988; "Agricultural Export Rehabilitation Project: Tanzania", March 1988; and "Agricultural Credit and Export Promotion Project: Zimbabwe", April 1989.

²The focus on diversification among existing commodities is justified because the agricultural exports of Malawi, Tanzania and Zimbabwe are concentrated in a small number of commodities. It is assumed that there is an existing (though not necessarily adequate) base of knowledge, infrastructure and support services that would allow for some reallocation of resources among these commodities.

³The change in a country's export mix is the result of endogenous and exogenous factors. For example, changing international commodity prices can cause a change in the export mix by changing the value of export earnings while export volume remains constant.

⁴Trends are calculated using an ordinary least squares (OLS) linear time trend. The OLS linear trend regression is estimated as:

$$X_t = \alpha + \beta t + e_t \quad (E.1)$$

where X_t is the observation in year t , α is the constant, β is the coefficient of the time trend ($t = 1, \dots, T$), and e_t represents the error term.

The models are not evaluated for statistical validity, and they are likely to be "misspecified". Rather than make ad-hoc corrections, such as is frequently done for heteroskedasticity, there is no attempt to correct for model misspecifications or use formal tests of significance.

⁵The CV is calculated as:

$$\frac{\left[\frac{\sum_t^T (X_t - \hat{X}_t)^2}{T} \right]^{\frac{1}{2}}}{\bar{X}} * 100 \quad (E.2)$$

where X_t is the observation in year t, \hat{X}_t is its value predicted from the trend model in equation (E.1), \bar{X} is the overall mean, and T is the number of observations in each subperiod.

⁶The ogive, entropy and Gini-Hirschman indices give very similar rankings of export concentration and are, in general, interchangeable.

⁷Like the entropy and Gini-Hirschman indices, the ogive index is very sensitive to decisions on which (and how many) N commodities are included in the analysis.

⁸Depending on the purpose of the analysis, the variances and covariances can be calculated for values, volumes, or unit values (value divided by volume) for the commodities in the export portfolio.

⁹Here the covariance matrix consists of normalized covariances, and is calculated as:

$$COV (X_p, X_j) = \frac{1}{N} \sum_{t=1}^T \frac{X_{it} - \hat{X}_{it}}{\bar{X}_i} \cdot \frac{X_{jt} - \hat{X}_{jt}}{\bar{X}_j} \quad (E.3)$$

Covariance and correlation coefficients are closely related. The covariance matrix can be expressed as:

$$COV(X_i, X_j) = \rho_{ij} \sigma_i \sigma_j \quad (E.4)$$

where ρ_{ij} is the correlation coefficient and σ_i and σ_j are standard deviations.

¹⁰The portfolio variance can also be used to measure the impact of adding new commodities to the country's export mix or the interaction between export earnings and import outlays.

¹¹This concept of export diversification is based on the Markowitz-Tobin portfolio method, which was originally applied to choosing optimal mixes of financial assets. According to this method, the problem is to determine the set of mean-variance (E-V) efficient portfolios, where the solution is based on minimizing the variance subject to different levels of expected returns. Although the portfolio variance in equation (2) provides a unique rank-ordering of all portfolios with a given expected return, it does not allow for the determination of a country's optimal export portfolio, since neither the expected export earnings for individual commodities, nor the policymakers' attitudes toward risk are considered.

¹²Under any circumstances use of the portfolio approach for planning a country's export mix might be questionable. Financial assets are characterized by linearly homogeneous returns, and minimal transactions costs for adding and disposing of assets. In contrast, agricultural production and marketing "assets" are often characterized scale economies (which encourage specialization), and potentially large adjustment costs for changing the export mix.

¹³Decomposition of variance using a series expansion is another method used for assessing the relative contribution of volume and unit value instability to total value instability (Hazell, et al.). However, the use of this technique requires a well-specified statistical model.

¹⁴Identifying the source of export earnings instability is important. Stabilization policies often focus attention on price-risk, which in the case of a small-country exporter is exogenous. Price-based stabilization policies include buffer stocks and forward pricing mechanisms. If the instability of export earnings is primarily due to the instability of export volume, then price-based stabilization policies will not be effective in reducing export earnings instability. Export volume instability, or yield-risk can be exogenous (i.e., due to weather, pestilence), or endogenous (i.e., due to policy distortions, or the inefficiency of infrastructure and support services). Obviously, the source of yield-risk will have a major impact on the design of appropriate policies.

¹⁵If PVPRICE and PVEARN give similar results then the country's instability-reducing export portfolio could be calculated based solely on international commodity price movements. If PVPRICE and PVEARN give different results then the country's pattern of domestic production and exports are offsetting international price movements and need to be considered in the stabilization scheme.

¹⁶The break at 1973 divides the data into 14- and 13-year periods, and marks the major world economic upheavals that took place in 1973-1974.

¹⁷The computerized database is based on data from the FAO Trade Yearbook and the FAO Production Yearbook. Thanks to Ms. Marcelle Thomas of IFPRI who provided this data on diskettes.

¹⁸Unit values reflect country-specific f.o.b. export commodity prices. Since unit values are calculated from country-specific trade data they should be a better reflection than world market prices. Export unit values should reflect differences in the seasonality of sales, bilateral contracts and/or other special marketing arrangements, types, grades and quality, and transportation and storage costs. However, export volume data are sometimes of poor quality relative to export earnings data.

¹⁹The Manufacturing Unit Value (MUV) Index is based on the \$US unit values of manufactured exports by G-5 countries (France, Germany, Japan, UK, U.S) to developing countries and reflects the purchasing power of exports from developing countries in international markets. See Siegel for the MUV used here.

²⁰Sugar was the commodity whose unit value increased most rapidly during the first period.

²¹Although sugar price variances are high (see Table 3), the strong negative correlation of its instability with both tobacco and beef prices make it a likely candidate for portfolio variance reduction. See equation 3.

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